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Examinations regarding the prevalence of intestinal parasitic diseases in Polish soldiers contingents assigned to missions abroad

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ABSTRACT

The aim of this paper is to present the program of diagnostic examinations regarding the detection and following treatment of intestinal parasitic diseases in the population of Polish soldiers serving in different climatic and sanitary conditions. Intestinal parasitoses remain one of the health problems of soldiers participating in contemporary military operations. This fact mainly results from unsatisfactory sanitary and hygienic standards in the regions where troops are deployed, contamination of water and soil, inappropriate processes of purifying drinking water, and the terrible condition of sewage systems, water purification plants, or sewage treatment facilities. The occurrence of such diseases is further facilitated by disregard of some basic principles of food and feeding hygiene. Mass examinations of Polish troops to find the prevalence of intestinal parasitoses will cause a decrease in the morbidity rate of parasitic diseases among Polish soldiers deployed in military operations. They can also lead to a decrease in expenditure on medical treatment of disease-related complications and on damages awarded to soldiers who have developed a serious disease while being engaged in a mission abroad.

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Key words: intestinal parasitic diseases, Polish Military Contingents

INTRODUCTION

Contemporary military operations with the participation of the Polish Armed Forces have been executed in areas characterized by adverse climatic and sanitary conditions [1]. The majority of peacekeeping and stabilization missions have been conducted in areas where, as a result of ongoing hostilities, low hygienic standards and poor sanitary conditions and the risk of developing infectious and parasitic diseases is much increased [2]. Participants of military operations run the risk of contact with different pathogens causing food and water-borne diseases [3]. Infections with helminthes (*Ascaris lumbricoides*, *Taenia spp.*, *Ancylostoma duodenale*, *Necator americanus*, *Trichuris trichiura, Strongyloides stercoralis*) and protozoa (*Giardia intestinalis, Cryptosporidium parvum, Entamoeba histolytica*) are widespread [4]. Presently, it has been estimated that diarrhoea occurs in more than 50% of all military personnel assigned to a tour of duty in countries characterized by low sanitary conditions [5]. The spread of diarrhoeal diseases is strongly influenced by a high proportion of carriers of intestinal pathogens among the local population and by contamination of food and water [6]. The author of this article conducted research work in Eastern Chad (an area of deployment of Polish troops) in 2009, during the dry season in April and the wet season in August-September. The primary aim of the study was to analyse the incidence rate of parasitic diseases of the digestive tract occurring in

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the group of Polish soldiers assigned to military service in Central Africa. The results of the research, which demonstrated numerous parasitic infections among Polish troops in the mission area, motivated the author to conduct examinations regarding the prevalence of intestinal parasites in the Polish Armed Forces.

The funds allocated for the execution of this program in the period 2010–2014 will make it possible to diagnose and treat parasitic diseases on a mass scale. The cost of the therapy of parasitic infections that had not been subjected to medical treatment before, immediately after developing a disease, is quite high. This is mostly due to the numerous complications which may occur, but also the legal aspect of the subject matter — an increased number of claims for damages on the grounds of developing an illness while being assigned to military service overseas [7]. Recent military operations with the involvement of Polish troops, especially combat missions conducted in Iraq and Afghanistan, have focused the attention of military health services on traumatic profile and psychiatric disorders occurring among participants of the operations [8, 9]. The diagnostics of infectious and invasive diseases is normally performed in laboratories which have signed contracts with military medical boards (whose main task is to evaluate the capability of military personnel for service abroad). Stool examinations for the presence of parasitic diseases are conducted twice — before and after being deployed on a mission area. In both cases it is performed by means of just one diagnostic method, which, according to international literature, allows the diagnosticians to detect only 30% of the pathogens [10, 11]. Thus, present-day diagnostic procedures do not reflect the actual health problems of Polish soldiers in the aspect of parasitic infections. Previous research into intestinal parasitic diseases occurring among soldiers serving in the Polish Armed Forces has been conducted in the Military Institute of Medicine as part of its statutory tasks (a research paper entitled *Health Hazards of the Contemporary Theatre of Operations in Different Climatic and Sanitary Conditions).* Examinations performed using 3 diagnostic methods in the Department of Epidemiology and Tropical Medicine of the Military Institute of Medicine (DETM MIM) demonstrated a high incidence rate of infections with intestinal parasitoses.

The reasons for implementing the proposed examinations were:

- absence of any important logistical difficulties for the execution of the program;
- effectiveness of the diagnostic procedures based on several testing methods;
- low cost of the examinations (much lower price of implementing certain preventative measures at present than the cost of medical treatment of their possible complications in the future);
- remarkably important subject matter in terms of health policy (the analysis of infections causing epidemiological risk for the country's population);
- the many-year-long participation of the Polish Armed Forces in military operations abroad and allied commitment in the international arena in the context of Polish participation in future missions oblige the military health services to take regular action in the field of health prevention and treatment; it also explains the necessity to implement the given program and to consider it a priority at the present time and in the future.

THE AIMS OF THE PROGRAM

The main aim of the program is to analyse the prevalence of, and to eliminate intestinal parasitic diseases from, the thousands of Polish soldiers participating in peacekeeping and stabilization missions abroad. Presently, parasitic diseases account for only a small fraction of all health problems diagnosed among soldiers serving in Polish Military Contingents deployed to areas where different climatic and sanitary conditions prevail. However, this situation does not fully reflect the scale of the problem or the actual morbidity rate. Numerous parasitoses have not been diagnosed at all or they have been classified as non-invasive diseases due to the absence of full laboratory diagnostic capabilities.

DETAILED AIMS

- Introduction of obligatory parasitological stool examinations (performed by means of 3 diagnostic methods in the laboratory of the DETM MIM for the use of military medical boards issuing a certificate of aptitude for military service after being assigned to an overseas tour of duty;
- Decreasing the morbidity rate of parasitic diseases of the digestive tract among Polish soldiers participating in military missions, through higher detection rate of invasive disease pathogens;
- Decreasing the expenditure on medical treatment of disease-related complications and on damages awarded to soldiers who develop a serious disease while engaged in a mission abroad;

- Introduction of obligatory training sessions for medical personnel participating in military missions abroad, in the field of laboratory diagnostics of parasitic diseases performed in the DETM MIM;
- Amending legal acts concerning medical examination of soldiers, conducted in order to evaluate their health condition and aptitude for military service before and after being deployed overseas (The Order of the Minister of National Defence of 16.06.2004 on medical examinations of professional soldiers assigned to military service abroad and soldiers home-bound after termination of service (Dz.U.[1] no. 148, item 1557).

STAGES OF IMPLEMENTATION OF THE PROGRAM

STAGE 1

- Setting up a parasitological laboratory (4 workstations) in the DETM MIM in Gdynia, Poland for the purpose of creating a research centre where intestinal parasitic diseases occurring among soldiers serving in the Polish Armed Forces could be diagnosed;
- Introducing training sessions for medical personnel employed in military units contributing soldiers participating in the program, in the field of collecting, preserving, storing, and transporting biological specimens (stool).

STAGE 2

- Examinations of biological specimens (stool) collected from soldiers participating in the program regarding the presence of intestinal parasitic diseases (helminthiases, protozoan diseases);
- Sending medical records of soldiers participating in the program (collective lists including test results and individual test results of patients diagnosed with parasitic diseases) to heads of military medical service of units in Poland and abroad, where the examined soldiers are stationing, in order to inform them of test results or to implement appropriate medical treatment either on an out-patient or in-patient basis;
- Repeated examinations of stool specimens collected from patients diagnosed with parasitic diseases, at least 4 weeks following the termination of treatment, in order to confirm negative test results;
- Practical and theoretical training sessions for medical personnel in the field of laboratory diagnostics of intestinal parasitic diseases;
- Regular reports to the Head of the Military Health Service Inspectorate and the Head of the Military Institute of Medicine concerning the execution of the program in successive years.

ORGANIZATION OF PROCEDURES

- Preparing and sending collective lists of soldiers participating in the program to its coordinating body (DETM MIM) by military unit commanders (organizational divisions) where the selected soldiers are stationed;
- Reporting soldiers participating in the program to selected medical personnel employed in military units in Poland or abroad in order to be informed about the examinations and to collect stool specimen containers;
- Arranging the schedule for collecting, preserving, storing, transporting, and examining the biological material (stool specimens);
- Conducting laboratory examinations:
  - parasitological examinations of stool specimens will be conducted by means of a light microscope using three diagnostic methods (direct preparation, preparation from decantation, and flotation) to detect the presence of intestinal helminthes and protozoans,
  - stool specimens will be collected from each patient three times, at regular intervals of 2–3 days; thus, the biological material collected from each patient will be examined in 9 preparations;
- Registering the results in collective medical records, issuing individual examination results of the conducted parasitological investigation for patients diagnosed with a parasitic disease;
- Sending the medical records of all soldiers involved in the program (collective lists of examination results, individual examination results of the infected patients) to the heads of military health service of units in Poland or abroad, from which the studied group of soldiers had been selected, in order to notify military personnel of the examination results, and in the case of infected soldiers to inform them about the necessity of taking up medical treatment either on an in-patient or out-patient basis;
- Conducting control examinations among patients diagnosed with helminthiases or protozoan diseases to confirm their negative result.

MATERIALS AND METHODS USED IN THE PROGRAM

The diagnostics of intestinal parasitic diseases will be performed by means of 3 standard stool examination methods using a light microscope:

- direct smear in Lugol's solution;
- preparation from decantation (sedimentation) in distilled water;
- preparation from Fülleborn's flotation [12, 13].

Clinical examination or even advanced imagining techniques are often insufficient methods when it comes to accurate diagnostics of parasitoses. Therefore, parasitological diagnostics are generally based on classical laboratory methods, such as microscopic techniques.

One of the tools for detecting parasitic diseases used in the laboratory of the DETM MIM (4 workstations) is a light microscope equipped with a digital camera connected to a computer. Using such a microscope makes it possible to take photographs of detected pathogens and archive the images.

DETAILED DESCRIPTION OF PROCEDURES INCLUDED IN THE PROGRAM

- Stool specimen containers and fixative (formalin 10%, ethanol 96%, or SAF preservative) are to be supplied to military units in Poland and abroad (Polish Military Contingents, PMC) where selected soldiers will be subjected to examination;
- Soldiers participating in the program will report to the selected medical personnel in order to receive information concerning the examinations and to collect stool specimen containers;
- Soldiers participating in the program will collect faeces specimens in the containers they receive three times at regular intervals of 2–3 days; they will deliver the stool specimens to an outpatient clinic based in their military units in Poland or abroad (PMC);
- Upon receiving a stool specimen medical staff of a particular outpatient clinic (a nurse, a paramedic) will preserve (formalin 10%, ethanol 96%, SAF preservative) and store it in a refrigerator at a temperature of 2–8°C or in a cool place where the temperature does not exceed 15–16°C. Medical staff will label all containers with stool specimens and prepare a collective list of patients subjected to examinations;
- Once the stool specimens have been collected and transported from military units to the DETM MIM in Gdynia, Poland with all required sanitary standards maintained (transport refrigerators, isothermal containers), the specimens will be subjected to diagnostic evaluation by means of a light microscope;
- Possible positive results of parasitological examinations conducted by means of 3 methods of light microscopy will be verified in the National Centre of Tropical Medicine, in the Department of Tropical Parasitology of the Medial University of Gdansk, and in the Department and Clinic of Tropical and Parasitic Diseases of the Medical University of Poznan; the security of all personal details will be maintained;
- Possible positive results of parasitological examinations will also be verified by means of the PCR technique in the Department of Tropical Parasitology of the Medial University of Gdansk and in the Department of Human Physiology of the Warminsko-Mazurski University in Olsztyn; the security of all personal details will be maintained;
- In cases of soldiers deployed to military missions abroad (PMC) biological material will be collected within the mission area and then transported and examined in the DETM MIM in Gdynia; patients infected with parasitic diseases (on the basis of parasitological examination results delivered to the head of a particular health centre of the PMC) will be provided with medical treatment in the area of operations within the last 2 weeks before returning to Poland;
- Implementing pharmacotherapy for infested soldiers depends on the type of detected intestinal pathogens:
  - *Ascaris lumbricoides, Ancylostoma duodenale, Necator americanus, Trichuris trichiura* — albendazole tabs: 400 mg in a single dose,
  - *Strongyloides stercoralis* — ivermectine tabs: 200 μg/kg of body mass for 1–2 days; alternative treatment: albendazole tabs: 2 × 400 mg for 5–7 days,
  - *Enterobius vermicularis* — albendazole tabs: 400 mg in a single dose, treatment repeated after 2 weeks,
  - *Taenia spp.* (*T. saginata*, *T. solium*), *Diphyllobothrium latum* — prasiquantel tabs: 5–10 mg/kg of body mass in a single dose,
  - *Hymenolepis nana, H. diminuta* — prasiquantel tabs: 25 mg/kg of body mass in a daily dose,
  - *Entamoeba histolytica* — metronidazole tabs: 3 × 500 mg for 10 days,
  - *Giardia intestinalis* — metronidazole tabs: 2 × × 500 mg for 5 days;
- Soldiers deployed in a military mission area (PMC) characterized by different climatic and sanitary conditions, who were not subjected to parasitological stool examinations carried out within the framework of the program but reported episodes of acute diarrhoea, will receive antiparasitic drugs

during the last week of their service abroad (albendazole tabs in a single dose of 400 mg and metronidazole tabs, 2 × 500 mg for 5 days) — the proposal for further consideration by the Inspectorate of the Military Health Service.

MONITORING THE PROGRAM

1. The scope of conducted examinations:
   - the number of persons participating in the pro gram;
   - the number of persons who reported to examinations according to sex, age (< 25, 26–35, 36–45, > 46), and military rank (officer, non-commissioned officer, private, civilian).
2. The effects of conducted examinations:
   - the number of persons diagnosed with intestinal helminthiases;
   - the number of persons diagnosed with intestinal pathogenic protozoans;
   - the number of persons diagnosed with non-pathogenic intestinal protozoans;
   - the number of persons receiving medical treatment on an out-patient basis;
   - the number of persons receiving medical treatment on an in-patient basis.

DOCUMENTATION OF THE PROGRAM

- Collective and individual medical records of patients involved in the program will be prepared and kept in accordance with binding legal regulations concerning medical records;
- A report on the execution of the program as well as collective reports summing up the accomplishment of the program throughout a given year will be prepared by the Head of the DETM MIM in Gdynia;
- Current assessment of the execution of the program — by 31st December every year, reports to the Head of the Inspectorate of the Military Health Service and to the Head of the Military Institute of Medicine;
- Summing up the program — a concluding report to the Head of the Inspectorate of the Military Health Service and to the Head of the Military Institute of Medicine — by 15th January 2015.

LEGAL BASIS

The Program relates to significant epidemiological phenomena as well as important health problems and preventive actions; and, in accordance with the decision of the Minister of National Defence no. 333/MON issued on 11th July 2008 on assigning detailed scope of activities to the Inspectorate of the Military Health Service (Dz.Urz. MON[2] no. 15, item 190), all health prevention tasks have been assigned to the Inspectorate of the Military Health Service.

Article 6, section 1 of the Act of 27th June 1997 on occupational medicine services (Dz.U.[3] of 2004, no. 125, item 1317; of 2006, no. 141, item 1011; of 2008, no. 220, item 1416 and no. 234, item 1570) specifies that occupational medicine services are designated to perform tasks within the domain of implementing health prevention schemes among employees, initiating and executing health promotion programs based on the evaluation of health condition of employees.

Article 4, section 5 of the Act of 29th January 2004 The Law of national procurements (Dz.U.[4] of 2007, no. 223, item 1655; of 2008, no. 171, item 1058, no. 220, item 1420, and no. 227, item 1505; and of 2009, no. 19, item 101, no. 65, item 545, no. 91, item 742, and no. 157, item 1241) specifies that the Act is not applicable to procurements covered by state secrets, in accordance with the regulations on the protection of classified information, or if it is not justified by important interests of state security.

ORGANS AND ORGANIZATIONAL UNITS OF THE DEPARTMENT RESPONSIBLE FOR THE EXECUTION OF THE PROGRAM

- The coordinator of the program is the Department of Epidemiology and Tropical Medicine of the Military Institute of Medicine in Gdynia;
- Subcontractors of the program within the scope of collecting, preserving, and storing biological specimens (stool) will be medical personnel working in military units in Poland and abroad (PMC), where soldiers participating in the program are stationed;
- If necessary, the subcontractor in the domain of verifying positive results of parasitological examinations to be conducted by means of 3 methods of light microscopy will be the National Centre of Tropical Medicine, Department of Tropical Parasitology of the Medical University of Gdansk;
- If necessary, the subcontractor in the domain of verifying positive results of parasitological examinations to be conducted by means of 3 methods of light microscopy will be the Department and Clinic of Tropical and Parasitic Diseases of the Medical University of Poznan;
- If necessary, the subcontractor in the domain of verifying positive results of parasitological examinations to be conducted by means of PCR technique will be the Department of Tropical Parasi-

tology of the Medical University of Gdansk and the Department of Human Physiology of Warminsko-Mazurski University in Olsztyn;
- Supervision of the organization of the program will be exercised by the Head of the DETM MIM;
- Supervision of the content-related execution of the program will be exercised by the Consultant of the Military Health Service in the Field of Epidemiology;
- Supervision of the whole program will be exercised by the Head of the Inspectorate of the Military Health Service.

CONTINUATION OF ACTIONS DISCUSSED IN THE PROGRAM

If a substantial number of parasitic infections of the digestive tract are diagnosed in the group of soldiers serving in the Polish Armed Forces in the period 2010–2014, it will be reasonable to continue the program in the future in order to implement further diagnostic procedures and appropriate treatment of parasitic diseases.

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